CPC COOPERATIVE PATENT CLASSIFICATION

F24H FLUID HEATERS, e.g. WATER OR AIR HEATERS, HAVING HEAT GENERATING MEANS, IN GENERAL (heat-transfer, heat-exchange or heat-storage materials C09K 5/00; tube furnaces for thermal non-catalytic cracking C10G 9/20; devices, e.g. valves, for venting and aerating enclosures F16K 24/00; steam traps or like apparatus F16T; steam generation F22; combustion apparatus F23; domestic stoves or ranges F24B, F24C; domestic- or space-heating systems F24D; furnaces, kilns, ovens, retorts F27; heat-exchangers F28; electric heating elements or arrangements H05B)

NOTES

1. The distinguishing feature of the air heaters covered by this subclass is that the heat is predominantly released to the air by convection, mostly by forced circulation of the air. The domestic stoves or ranges covered by subclasses F24B, F24C may also be fired or electric air heaters but they release their heat to a considerable extent by radiation and only to some extent by natural convection.
2. In this subclass the following terms are used with the meanings indicated:
   - "Water" includes other liquids;
   - "air" includes other gases or gas mixtures;
   - "water" and "air" always mean, respectively, the liquid and gas to be heated;
   - "Furnace tubes" means tubes inside the heater wherein combustion is performed;
   - "Fire tubes" means tubes inside the heater through which flue-gases flow from a combustion chamber located outside the tubes;
   - "Heater" means apparatus including both heat generating means and means for transferring the generated heat to water or air.
3. All storage heaters are classified in group F24H 7/00.

1/00 **Water heaters having heat generating means, e.g. boiler, flow- heater, water-storage heater** (F24H 7/00, F24H 8/00 take precedence; details F24H 9/00; steam boilers F22B; domestic stoves or ranges with additional provisions for heating water F24B 9/00, F24C 13/00)

1/0009 . {of the reduced pressure or vacuum steam type}
1/0018 . {using electric energy supply}
1/0027 . {using fluid fuel}
1/0036 . . {of the sealed type}
1/0045 . . {with catalytic combustion}
1/0054 . {Gas- or oil-fired immersion heaters for open containers or ponds}
1/0063 . {using solid fuel}
1/0072 . {Special adaptations}
1/0081 . . {for bath tubs}
1/009 . . {for vehicle systems}
1/06 . Portable or mobile, e.g. collapsible
1/08 . Packaged or self-contained boilers, i.e. water heaters with control devices and pump in a single unit
1/10 . Continuous-flow heaters, i.e. in which heat is generated only while the water is flowing, e.g. with direct contact of the water with the heating medium (F24H 1/50 takes precedence)
1/101 . . {using electric energy supply}
1/102 . . . {with resistance}
1/103 . . . . {with bare resistances in direct contact with the fluid}
1/105 . . . . {formed by the tube through which the fluid flows}
1/106 . . . {with electrodes}
1/107 . . {using fluid fuel}
1/108 . . {using solid fuel}
1/12 . . in which the water is kept separate from the heating medium
1/121 . . . {using electric energy supply}
1/122 . . . . {combined with storage tank}
1/124 . . . {using fluid fuel}
1/125 . . . . {combined with storage tank}
1/127 . . . {using solid fuel}
1/128 . . . . {combined with storage tank}
1/14 . . . by tubes, e.g. bent in serpentine form
1/142 . . . . {using electric energy supply}
1/145 . . . . {using fluid fuel}
1/147 . . . . {using solid fuel}
1/16 . . . . helically or spirally coiled
1/162 . . . . . {using electrical energy supply}
1/165 . . . . . {using fluid fuel}
1/167 . . . . . {using solid fuel}
1/18 . Water storage heaters (combined with water-heating stoves for central heating F24H 1/22; F24H 1/50 takes precedence)
1/181 . . {Construction of the tank (containers or tanks in general B65D, e.g. metal containers B65D 7/00)}
1/182 . . . {Insulation (containers with thermal insulation in general B65D 81/38)}
1/183 . . . {Inner linings (linings for containers in general B65D 25/14, B65D 90/04)}
1/185 . . {using electric energy supply (F24H 1/201 takes precedence)}
1/186 . . {using fluid fuel}
1/187 . . {using solid fuel}
1/188 . . {with means for compensating water expansion}
1/20 . . with immersed heating elements, e.g. electric elements or furnace tubes
1/201 . . . {using electric energy supply}
1/202 . . . . {with resistances}

1/203 . . . . {with electrodes}
1/205 . . . {with furnace tubes}
1/206 . . . . {with submerged combustion chamber}
1/207 . . . . {with water tubes}
1/208 . . . {with tubes filled with heat transfer fluid}
1/22 . Water heaters other than continuous-flow or water storage heaters, e.g. water-heaters for central heating (F24H 1/50 takes precedence)
1/225 . . {electrical central heating boilers}
1/24 . . with water mantle surrounding the combustion chamber or chambers (F24H 1/40, F24H 1/44 take precedence)
1/26 . . . the water mantle forming an integral body
1/263 . . . . {with a dry-wall combustion chamber}
1/28 . . . . including one or more furnace or fire tubes
1/282 . . . . . {with flue gas passages built-up by coaxial water mantles}
1/285 . . . . . {with the fire tubes arranged alongside the combustion chamber}
1/287 . . . . . {with the fire tubes arranged in line with the combustion chamber}
1/30 . . . the water mantle being built up from sections
1/32 . . . . with vertical sections arranged side by side
1/34 . . with water chamber arranged adjacent to the combustion chamber or chambers, e.g. above or at side (F24H 1/24, F24H 1/44 take precedence)
1/36 . . . the water chamber including one or more fire tubes
1/38 . . with water contained in separate elements, e.g. radiator-type element (F24H 1/40, F24H 1/44 take precedence)
1/40 . . with water tube or tubes (F24H 1/44 takes precedence)
1/403 . . . {the water tubes being arranged in one or more circles around the burner}
1/406 . . . {the tubes forming a membrane wall}
1/41 . . . in serpentine form
1/43 . . . helically or spirally coiled
1/44 . . with combinations of two or more of the types covered by groups F24H 1/24 - F24H 1/40, {e.g. boilers having a combination of features covered by F24H 1/24 - F24H 1/40}
1/445 . . . {with integrated flue gas condenser}
1/46 . Water heaters having plural combustion chambers
1/48 . Water heaters for central heating incorporating heaters for domestic water
1/50 . . incorporating domestic water tanks
1/52 . . incorporating heat exchangers for domestic water (F24H 1/50 takes precedence)
1/523 . . . {Heat exchangers for sanitary water directly heated by the burner}
1/526 . . . {Pipes in pipe heat exchangers for sanitary water}

3/00 Air heaters having heat generating means (F24H 7/00, F24H 8/00 take precedence; details F24H 9/00; domestic stoves or ranges with additional provision for convection heating of air F24B, F24C)

3/002 . {using electric energy supply}
3/004 . . {with a closed circuit for a heat transfer liquid}
3/006 . {using fluid combustibles}
3/008 . {using solid combustibles}
3/02 . with forced circulation (F24H 3/12 takes precedence)
3/022 . . {using electric energy supply}
3/025 . . {using fluid combustibles}
3/027 . . {using solid combustibles}
3/04 . . the air being in direct contact with the heating medium, e.g. electric heating element
3/0405 . . . {using electric energy supply, e.g. the heating medium being a resistive element; Heating by direct contact, i.e. with resistive elements, electrodes and fins being bonded together without additional element in-between (F24H 3/06, F24H 3/08, F24H 3/10 take precedence)}
3/0411 . . . . {for domestic or space-heating systems}
3/0417 . . . . . {portable or mobile}
3/0423 . . . . {hand-held air guns}
3/0429 . . . . {For vehicles}
3/0435 . . . . . {Structures comprising heat spreading elements in the form of fins}
3/0441 . . . . . {Interfaces between the electrodes of a resistive heating element and the power supply means}
3/0447 . . . . . {Forms of the electrode terminals, e.g. tongues or clips}
3/0452 . . . . . {Frame constructions}
3/0458 . . . . . {One-piece frames}
3/0464 . . . . . {Two-piece frames, e.g. two-shell frames, also including frames as a central body with two covers}
3/047 . . . . . {Multiple-piece frames assembled on their four or more edges}
3/0476 . . . . . {Means for putting the electric heaters in the frame under strain, e.g. with springs}
3/0482 . . . . . {Frames with integrated fan}
3/0488 . . . {using fluid combustibles}
3/0494 . . . {using solid combustibles}
3/06 . . the air being kept separate from the heating medium, e.g. using forced circulation of air over radiators
3/062 . . . {using electric energy supply; the heating medium being the resistive element (F24H 3/08, F24H 3/10 takes precedence)}
3/065 . . . {using fluid combustibles}
3/067 . . . {using solid combustibles}
3/08 . . . by tubes
3/081 . . . . {using electric energy supply}
3/082 . . . . . {The tubes being an electrical isolator containing the heater}
3/084 . . . . . {The tubes being an electrode for the heater}
3/085 . . . . . {The tubes containing an electrically heated intermediate fluid, e.g. water}
3/087 . . . . {using fluid combustibles}
3/088 . . . . {using solid combustibles}
3/10 . . . by plates
3/102 . . . . {using electric energy supply}
3/105 . . . . {using fluid combustibles}
3/107 . . . . {using solid combustibles}
3/12 . with additional heating arrangements

4/00 Fluid heaters using heat pumps

4/02 . Liquid heaters
4/04 . . Storage heaters

4/06 . Gas heaters

6/00 Combined water and air heaters (F24H 8/00 takes precedence)

7/00 Storage heaters, i.e. heaters in which energy is stored as heat in masses for subsequent release (domestic stoves or ranges with additional heat storage masses F24B 1/24, F24C 15/34)

7/002 . {with electrical energy supply}
7/005 . {with fluid fuel}
7/007 . {with solid fuel}
7/02 . the released heat being conveyed to a transfer fluid, e.g. air, water
7/0208 . . {with electrical energy supply}
7/0216 . . . {the transfer fluid being air}
7/0225 . . . . {with supplementary heating means}
7/0233 . . . {the transfer fluid being a liquid}
7/0241 . . . . {with supplementary heating means}
7/025 . . {with fluid fuel}
7/0258 . . . {the transfer fluid being air}
7/0266 . . . {the transfer fluid being a liquid}
7/0275 . . {with solid fuel}
7/0283 . . . {the transfer fluid being air}
7/0291 . . . {the transfer fluid being a liquid}
7/04 . . with forced circulation of the transfer fluid
7/0408 . . . {with electrical energy supply}
7/0416 . . . . {the transfer fluid being air}
7/0425 . . . . . {with supplementary heating means}
7/0433 . . . . {the transfer medium being a liquid}
7/0441 . . . . . {with supplementary heating means}
7/045 . . . {with fluid fuel}
7/0458 . . . . {the transfer fluid being air}
7/0466 . . . . {the transfer fluid being a liquid}
7/0475 . . . {with solid fuel}
7/0483 . . . . {the transfer fluid being air}
7/0491 . . . . {the transfer fluid being a liquid}
7/06 . the released heat being radiated
7/062 . . {with electrical energy supply}
7/065 . . {with fluid fuel}
7/067 . . {with solid fuel}

8/00 Fluid heaters having heat-generating means specially adapted for extracting latent heat from flue gases by means of condensation

8/003 . {having means for moistening the combustion air with condensate from the combustion gases}
8/006 . {Means for removing condensate from the heater}

9/00 Details

9/0005 . {for water heaters}
9/001 . . {Guiding means}
9/0015 . . . {in water channels}
9/0021 . . . . {Sleeves surrounding heating elements or heating pipes, e.g. pipes filled with heat transfer fluid, for guiding heated liquid}
9/0026 . . . {in combustion gas channels}
9/0031 . . . . {with means for changing or adapting the path of the flue gas}
9/0036 . . {Dispositions against condensation of combustion products}
9/0042 . . {Cleaning arrangements}
9/0047 . . {Protections against galvanic corrosion, e.g. cathodic protections, electrolytic protections}
9/0052 . {for air heaters}
9/0057 . . {Guiding means}
9/0063 . . . {in air channels}
9/0068 . . . {in combustion gas channels}
9/0073 . . {Arrangement or mounting of means for forcing the circulation of air}
9/0078 . . . {for storage heaters}
9/0084 . {Combustion air preheating}
9/0089 . . {by double wall boiler mantle}
9/0094 . {having means for transporting the boiler}
9/02 . Casings; Cover lids; Ornamental panels
9/06 . Arrangement of mountings or supports {for heaters, e.g. boilers, other than space heating radiators (space heating radiators F24D 19/02)}
9/12 . Connecting heaters to circulation pipes (pipe joints in general F16L)
9/122 . . {for water heaters}
9/124 . . . {storage heaters}
9/126 . . . . {Arrangement of inlet valves used therewith (valves per se F16K)}
9/128 . . . {continuous flow heaters}
9/14 . Connecting different sections, e.g. in water-heaters (in radiators F28F 9/26)
9/142 . . {Connecting hydraulic components}
9/144 . . . {Valve seats, piping and heat exchanger connections integrated into a one-piece hydraulic unit}
9/146 . . {Connecting elements of a heat exchanger}
9/148 . . {Arrangements of boiler components on a frame or within a casing to build the fluid heater, e.g. boiler}
9/16 . Arrangements for water drainage (valves for drainage F16K, e.g. F16K 21/00; in pipes or pipe systems in general F16L 55/00; in domestic- or space-heating systems F24D 19/08)
9/165 . . {Devices for retaining leaking fluid from heaters}
9/18 . Arrangement or mounting of grates, burners, or heating elements (burners F23D; grates F23H; electric heating elements H05B)
9/1809 . . {for water heaters}
9/1818 . . . {electric heating means}
9/1827 . . . . {PTC Positive temperature coefficient resistor}
9/1836 . . . {fluid combustible heating means}
9/1845 . . . {solid combustible heating means}
9/1854 . . {for air heaters}
9/1863 . . . {electric heating means}
9/1872 . . . . {PTC Positive temperature coefficient resistor}
9/1881 . . . {fluid combustible heating means}
9/189 . . . {solid combustible heating means}
9/20 . Arrangement or mounting of control or safety devices {or methods} (control valves F16K; safety devices for burners F23D; combustion control devices F23N; of systems comprising a heater, see the relevant subclasses, e.g. of control heating systems F24D 19/10; automatic switching for electric heating apparatus H05B 1/02)
9/2007 . . {for water heaters}
9/2014 . . . {for heaters using electrical energy supply}
9/2021 . . . . {Storage heaters}
9/2028 . . . . {Continuous-flow heaters}
9/2035 . . . {for heaters using fluid combustibles}

9/2042 . . . . {Preventing or detecting the return of combustion gases}
9/205 . . . . . {Closing the energy supply}
9/2057 . . . {for heaters using solid combustibles}
9/2064 . . {for air heaters}
9/2071 . . . {for heaters using electrical energy supply}
9/2078 . . . . {storage heaters}
9/2085 . . . {for heaters using fluid combustibles}
9/2092 . . . {for heaters using solid combustibles}

2203/00 **** to be deleted ****

2210/00 **Burner and heat exchanger are integrated**

2220/00 **Measures for environmentally correct disposal**

2230/00 **Solid fuel fired boiler**
2230/02 . Solid and fluid fuel fired boilers

2240/00 **Fluid heaters having electrical generators**
2240/01 . Batteries, electrical energy storage device
2240/02 . with combustion engines
2240/04 . . External combustion engines
2240/06 . . Internal combustion engines
2240/08 . with peltier elements
2240/09 . with photovoltaic cells
2240/10 . with fuel cells
2240/12 . with thermodynamic cycle for converting thermal energy to mechanical power to produce electrical energy
2240/122 . . Stirling cycles
2240/125 . . Carnot cycles
2240/127 . . Rankine cycles, e.g. steam heat engines

2250/00 **Electrical heat generating means**
2250/02 . Resistances
2250/04 . Positive or negative temperature coefficients, e.g. PTC, NTC
2250/06 . Peltier
2250/08 . Induction
2250/10 . Electrodes
2250/12 . Microwaves
2250/14 . Lamps